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RESEARCH ARTICLE

THE APPLICATION OF VACUUM-ASSISTED CLOSURE DEVICE IN THE MANAGEMENT OF EMPYEMATHORACIS

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Abstract

The use of new technologies in thoracic surgery has become well established. Vacuum Assisted Closure (VAC) device is one of such technologies. Surgeons were spectacle about its use since it was thought to interfere with the negative intraplueral pressure. Few reports have been published in regards to its use in cases of empyema thoracis. We report a case of empyema thoracis that was managed surgically. Thoracotomy and decortication complicated later on by surgical site infection for which debridement and application of VAC devise was used to drain the intrapleural collection as well as the subcutaneous collection. We concluded that the use of VAC device in empyema thoracis is feasible with very good outcome.

Introduction:-

Vacuum-assisted closure (VAC) therapy has been effectively used for a wide of range woundsand infections. These include infected surgical wounds, diabetic foot ulcers, pressure ulcers, traumatic wounds and venous stasis ulcers(1). In 2006, the VAC therapy was applied for the first time in the management of empyema thoracis(2). The use of VAC device was used later for various intrathoracic infections such as,postresection empyema,mediastinitis related to esophageal surgery, as well as necrotizing pleuropulmonary infections. In all these conditions, VAC therapy has been a useful tool that accelerates the healing process with an*excellent*safety profile(3). Moreover, its use is usually associated with a better outcome in terms of decreased morbidity, shorter hospital stay, greater patient acceptance and it can provide an outpatient based management (3,4).

The Case:-

A 50-year-old male who is smoker and diabetic on insulin presented to our service with pleuritic chest pain, dyspnea and fever. On initial presentation he was tachypnic, temperature 37.3C° and oxygen saturation was 93% on 5 Liters of oxygen. Auscultation revealed reduced air entry with bronchial breathing over the righthemithorax. Complete Blood Count (CBC) showed marked leukocytosis and neutrophilia. His initial chest x-ray revealed right lower lobe consolidation with air bronchogram. Community acquired pneumonia was the provisional diagnosis and was started on ceftriaxone and azithromycin.Over the next few days the patient did not seem to improve and was still spiking despite the use of broad spectrum antibiotics. Computed Tomography (CT) showed multiloculated right-sided pleural effusion with lower lobe consolidation(Figure 1). A Sagittal reconstruction demonstrate the loculation more clearly (Figure 2). Pleural tab was done. It yielded an exudate and the culture and stain were negative for growth. The patient underwentVideo Assisted ThoracoscopicSurgery (VATS) which revealed multiple, well-formed adhesions with multiloculated empyema space that was filled with frank pus. Conversion to thoracotomy, decortication and drainage of the pus with placement of drainage thoracostomytubes was done. A pleural biopsy was sent for tissue culture and sensitivity, cytology and histopathology which came negative for an infection or

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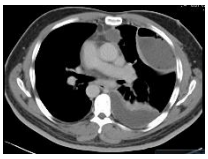
granulomas. On the 6th post-operative day, the wound demonstrated signs of surgical site infection (SSI). This was associated with new onset of pneumothorax evident radiologically. The patient was taken to the operating room and exploration of the wound was done with debridement of all unhealthy tissue. VAC device was placed into the communicating wound with the pleural space without thoracostomy drainage. The VAC device was changed twice on 3-day interval with vacuum pressures of around -120Hgmm. The VAC device was removed after complete healing of the wound. The patient was discharged with no subsequent complications. His last follow up at 6 months showed complete recovery. This has demonstrated that application of VAC with communication to pleural space without the usual thoracostomy drainage is feasible and did not interfere with the mechanics breathing.



Axial CT scan of the chest demonstrating the loculi which is consistent with empyema thoracis. The pockets of air can be seen within the collection..

Sagittal reconstruction demonstrate the multiloculated nature of this empyema thoracic.

Discussion:-

Accumulation of pus within the plural space is referred as empyema thoracis (5). Though the commonest cause of this condition is poorly managed bacterial pneumonia, empyema may also complicate thoracic procedures or surgeries, thoracic trauma, lung abscess, spontaneous pneumothorax and esophageal perforation (6). The commonly isolated bacteria include *Streptococcus milleri* group species, *Streptococcus pneumoniae*, methicillin-sensitive *Staphylococcus aureus* (MSSA) and the *Enterobacteriaceae* group. However, *Mycobacterium tuberculosis* is not uncommon isolated (5). Parapneumonic effusion may progress through exudative, fibrinolytic, and organized stages. Although the clinical course varies among patients, about 5% of pneumonia patients and 20% of patients with parapneumonic effusion will progress into empyema regardless of appropriate management. The mortality rate of patients with empyema, especially patients with co-morbidities, accounts for 20% (7). The potential complications of empyema include broncho-plural fistula, empyema necessitans, osteomyelitis of the ribs, bronchoesophgeal fistula, pericarditis and brain abscess which can develop either early or late during the clinical course. Managing the empyema properly depends on the stage of empyema, degree of lung function restriction and the patient tolerance and it requires control of the infection, evacuation of the purulent fluidand obliteration of the cavity. This can be achieved by an appropriate antibiotic therapy, closed chest tube drainage, intrapleuralfibrinolytics, VATS and thoracotomy-decortication (6). Open window thoracotomy and decortication can be used in organized empyema; however decortication is associated with considerable morbidity and mortality rate. VAC therapy is a well-known modality in wound treatment. Intrapleural application of VAC shown to aid in local infection control, enhances chest expansion and shrinks the empyema cavity (8). The negative pressure applied by the VAC device accelerates wound healing as it enhances the blood flow in the treated area and promotes healthy granulation tissue growth. Moreover, it decreases edema and excessive fluid from the wound and limits bacterial colonization (9). Our case was bit different in terms of using the VAC as a solo arm in draining the SSI as well as the communicating empyema without thoracostomy tubes. The author has published the use of the same technique in an empyema nescessitant case with excellent outcome (10).

Conclusion:-

Application of negative pressure through the VAC system is valuable in the management of complicated intrathoracic infections such as empyema.This modality of treatment offers a faster recovery with less patient

discomfort, therefore it decrease the hospital stay and the overall treatment costs. We advocate this modality of treatment for further evaluation by larger studies and clinical trials.

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